Teacher's Guide to
REGIONAL STUDIES OF CANADA

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SOUTHERN ONTARIO

Industry

By the study of specific towns, individual industries, and actual jobs, the first section of this chapter seeks to explain the nature of industrial development in Southern Ontario arriving finally at the generalizations on

Pp. 22-23

By means of photographs and large-scale maps, pupils are required to see for themselves the flatness of the land for industrial sites; they must measure the extent of waterfront locations;* by means of small-scale maps, they place Southern Ontario in its central location in the densely populated part of Canada, and in its North American and world position; again and again they see how important are road, rail, and water transportation routes, they count them on maps, see them on photographs; on large-scale maps they see symbols locating the sites of individual factories, in photographs they see the buildings themselves, they see raw materials being assembled, and read about the experiences of those who work in these industries; they probe into the past and discover how man has sought to make full use of the natural advantages and to solve the problems. Finally there is some consideration of the conservation of natural resources during industrialization.

Completing and studying this table will suggest many basic concepts in the geography of the Great Lakes-St. Lawrence cities.

(a) Local supplies of raw materials are not an important factor, though the early discovery of oil near Sarnia gave the original impetus to the establishment of the oil refining and associated industries in that city. Fresh water is the only raw material available locally in significant quantities.

(b) Water transportation and land transportation which developed along the old water routes are probably the most significant factors. By these means, the various raw materials, power, and personnel required for complex modern industries can be assembled.

(c) The heavily populated areas of Southern Ontario and Quebec provide a huge market: the central location in Canada and good transportation to other regions assist marketing.

(d) Large areas of flat land near land and water transportation assist establishment of modern plants, using conveyor belts, assembly lines, etc.; large local labor supply, many skilled workers.

(e) H.E.P. is clean, cheap, and inexhaustible. Southern Ontario is fairly flat, with few streams of sufficient gradient or volume for hydro-electric development. It has been necessary to import large quantities of fuel. Production of H.E.P. from the St. Lawrence was one of the prime objects of the St. Lawrence Seaway and Power Authority.

*These exercises will be greatly facilitated by the use of a piece of string and a ruler for measuring irregular distances. A school atlas such as *The Canadian Oxford School Atlas* and a good wall map or globe should be available for reference at all times.

P. 26 Factors which have helped the growth of industrial cities on the Great Lakes-St. Lawrence Waterway

Exercise 2-14 on page 13 serves to indicate how things can be shown on a large-scale map. Pupil activity consists mainly of finding things, of relating the symbols to the real objects, and understanding scale by visualizing and "travelling" selected distances shown on the map.

The map exercises on Figure 2–38 progress a step further. Photographs and detailed descriptive material assist pupils towards a greater understanding of the topographic map as a source document. Additional symbols, including contours, are introduced and some attempt to visualize the complete landscape is made. Finally, in addition to description, steps are made towards interpretation of the map.

P. 34 A summer excursion

The beaches on Lake Ontario are pleasant on a hot day. When they reached 350 feet above sea level they had walked 3 miles. They crossed the Queen Elizabeth Way and route 8. The train was on the Canadian National Railway. They climbed 275 feet in less than half a mile. The Niagara Escarpment also passes through the city of Hamilton. Eight out of ten roads shown stop at the foot of the Escarpment because the gradient becomes very steep One road reduces the gradient and makes a gradual ascent by means of an oblique approach The railway takes 3 miles to make the climb.

P. 36 Another look at the topographic map

1. Fruitland, Cherry Beach, Vinemount, and a cannery suggest that fruit growing is important.
2. More people live north of the Escarpment.
3. There are more orchards north of the Escarpment. Grapes flourish on the higher ground.
4. Peaches, cherries, pears, and strawberries are preserved in the cannery.
5. The main lines of communication connect the settlements which extend in an east-west direction. They avoid climbing the Escarpment.

P. 51 Reviewing Southern Ontario

This exercise is designed to assist the pupil to make generalizations concerning Southern Ontario, and attempts to provide some answers to the major questions posed on p. 2, at the outset of this study.

1. (a) Typical products might include:

Manufactured goods	*Agricultural products*	*Others*
Furniture	Baby foods	Salt
Cars	Cheese	Detergents
Electrical appliances	Tobacco	

(b) Few weeks pass without mail from Ontario, since this includes Government cheques, forms, etc; magazines and periodicals; advertisements; bonuses and premiums and large quantities of personal mail.

(c) Southern Ontario provides goods and services for almost every

Canadian home and also supplies a large proportion of our export produce.

2.

	Advantages	*Problems and their solution*
(a) *Position*	Water route to Atlantic, later followed by land transportation. Central in Canada.	Rapids and falls to be canalized. Ice in winter – icebreakers.
(b) *Transportation and Communication*	Good water and land links with supply areas and markets. Fairly flat land.	Ice closes waterway for several months.
(c) *Power*	Water transport for bulk fuel cheap.	No coal, oil or gas. Little H.E.P. Pipelines built. S. Lawrence Seaway and Power project.
(d) *Relief, Topography, and Scenery*	Fairly flat land for large-scale agricultural machinery; modern industrial complexes, highway and railway construction. Scenic wonders, e.g. Niagara Falls, Thousand Islands.	
(e) *Soils*	Deep mantle of soil left by ice – some favorable to agriculture, e.g. sandy soils for fruit. Most can be improved.	Drainage, fertilization.
(f) *Climate*	Longer growing season than most other parts of Canada. Generally adequate precipitation – Large-scale irrigation unnecessary. Southwest Ontario especially long growing season.	Severe winters require heated factories, snow clearance, etc. Livestock must be fed and housed. Early or late frosts damage crops. Flood damage from summer storms.
(g) *Historical Development*	Early development of settlement and industry in Southern Ontario enabled this area to claim the market, to establish its reputation and develop skilled workers and traditions.	

Vocabulary

Lists of words and phrases are provided in this Guide at the end of most chapters. These lists contain:
(a) words that may be unfamiliar to pupils — for such words a pronunciation key is given; (b) words and phrases that imply concepts which the teacher may wish to extend beyond the relevant material in this study. The list for this study follows.

p. 5 portaged (pôr' tijd)
p. 6 icebreaker
p. 7 elevation
p. 7 navigation
p. 7 international boundary
p. 7 powerhouse
p. 8 chute (shüt)
p. 8 bottleneck
p. 8 hydro-electric power development
p. 8 power sites
p. 10 commodity
p. 10 metallurgical (met′al er' jə kəl)
p. 10 primary iron and steel
p. 11 freighter
p. 12 limestone
p. 12 thermal plant
p. 12 insulation
p. 12 latex paint (lā' teks)
p. 12 synthetic rubber
p. 12 petrochemicals (pet′rō kem' ə kəlz)
p. 13 oil refining
p. 13 geometric
p. 15 scenic drive
p. 15 Parkway
p. 17 military functions
p. 17 service functions
p. 18 suburban
p. 18 domestic berths
p. 18 overseas berths
p. 20 sugar refining
p. 20 food processing
p. 22 metropolitan government
p. 22 music conservatories
p. 22 cultural centre
p. 22 subway
p. 22 municipalities
p. 22 urban area
p. 23 industrial sites
p. 24 secondary industries
p. 24 Macdonald-Cartier Freeway
p. 25 glacial drift
p. 25 till plains
p. 25 moraines (mə rānz')
p. 27 drumlins (drum' lənz)
p. 27 debris (də brē' *or* dā' brē)
p. 28 air masses
p. 29 humidities
p. 29 precipitation
p. 29 irrigation
p. 29 silo
p. 34 contour line
p. 36 vineyard
p. 38 gorge
p. 43 cash crops
p. 45 horticulture
p. 45 scrub
p. 46 conservation
p. 46 parkland
p. 46 voyageurs (voi′ ə zhėr)
p. 48 federal capital
p. 48 Green Belt

NORTHERN ONTARIO

Vast numbers of Canadians are familiar with Northern Ontario as a vacation area or as country through which one travels en route across Canada either by Trans-Canada Highway or transcontinental railways. This theme forms the introduction to the chapter.

Pp. 2-5 Recreational advantages of Northern Ontario include:
Mountain and lake scenery; vast areas of unspoiled bushland including many parks and reserves; tourist development and services, e.g. cruises, guides, accommodations: easy access by road and rail from heavily populated parts of Canada.

Pp. 5-11 Mining in Northern Ontario
The great significance of mining in Northern Ontario is illustrated by Figures 3-5 and 3-14.

Why is the Sudbury area a good location for a smelter? Question 4, p. 7 enables pupils to summarize the advantages for the development of mining and associated industries in many centres of Northern Ontario.
(a) many metallic ores in Canadian Shield.
(b) large quantities of H.E.P. readily available in rushing waters of Canadian Shield. Plentiful local supplies of wood provided fuel for early smelters.
(c) road and rail transport to east, west, and south well developed.
(d) good transportation plus proximity to heavily populated areas of Southern Ontario and Quebec assists marketing.
(e) recreational advantages of Canadian Shield attract personnel.

This theme is further developed on p. 9 where industrial advantages of Timmins are discussed. The factors which favored development of one natural resource - gold - are also advantageous to the promotion of other economic activities, e.g. forest industries and tourism. The labor force, facilities and services already developed provide added stimulus.

P. 11 Review of mining in Northern Ontario

1. Nickel	-	Sudbury
Copper	-	Sudbury, Manitouwadge
Gold	-	Red Lake, Pickle Crow, Timmins, Porcupine, Larder Lake.
Iron Ore	-	Atikokan, Michipicoten, Sudbury
Platinum	-	Sudbury
Cobalt	-	Cobalt
Uranium	-	Elliot Lake
Silver	-	Sudbury, Cobalt, Manitouwadge

2. Nickel is the most important metal by value.
3. Underground mining requires access to underground deposits by shaft and tunnels; e.g. nickel mine at Falconbridge. Open pit mining uses giant

shovels to scoop up surface deposits into trucks or freight cars; e.g. iron mines at Atikokan. This method requires less equipment, is cheaper and less dangerous. But work can be slowed down by poor weather. Open pit mining destroys the land surface, which is disadvantageous in areas of agricultural or scenic value.
4. Mining towns face special problems if mining is the only major employment, since their prosperity is peculiarly vulnerable to fluctuations in price and demand for a single product. Economic developers and planners are becoming increasingly aware of these problems, and some attempts are being made to establish more broadly based economies.

Physiography of Northern Ontario
Though physical factors are of prime significance in the geography of Southern Ontario they have almost everywhere been combined with the works of man to produce complex and changing landscapes. In Northern Ontario, vast areas are untouched by human influences. There are, moreover, basic similarities in the physical landscape of the entire region. This enables the pupil to view the physical landscape with reference to tourism, mining, farming, forest industries, and finally the origins of the landscape itself. The questions on p. 18 assist him to summarize the physiographic features with reference to human development.

1. *Agriculture* Glacial erosion removed the topsoil from vast areas. Gouging of the bedrock and disorganization of the drainage created many areas of poorly drained land.
2. *Industry* Disorganized drainage with many waterfalls and rapids, huge quantities of water, many natural reservoirs, all assist in the production of hydro-electricity.
3. *Recreation* Rocky scenery, many irregular-shaped lakes, frequent waterfalls and rapids make the Shield attractive to tourists.
4. *Transportation* Tremendous distances through rocky land with many streams and lakes to be bridged make construction of roads and railways difficult. Though elevations are generally quite low, local gradients may be steep.

A similar summary can be constructed with reference to (a) climate and (b) natural vegetation of Northern Ontario.

P. 19 The transition zone of the Near North
This area provides an unusually graphic illustration of the way in which regions, clearly identifiable in their own right, visibly merge into each other on the ground. The iron and steel complex shown in Figure 3-23 demonstrates graphic similarities with the site of that at Hamilton, but in the background characteristic forested Shield country can be plainly seen. Figures 3-23, 3-24, and 3-27 show large numbers of irregular-shaped lakes, rapids, and streams; extensive forest lands and generally low relief evoke again the characteristics of the Shield. The reappearance of the *Meadow Queen*, the emphasis on major urban developments, industries, and communications contrast vividly with the image promoted by Figure 3-22.

P. 23 Why is Northern Ontario an important region?

This final discussion must consider in review:

(a) Northern Ontario produces nearly 1/3 Canada's total mineral output including nearly 1/2 the total nickel and 1/4 the total copper.

(b) Northern Ontario is one of the world's greatest producers of pulp and paper.

(c) Great reserves of H.E.P.

(d) Vacation and recreational land.

(e) Successful farming can be carried on in some areas. Greater demand and improved techniques may increase agricultural value.

Vocabulary

p. 2 muskelunge (mus' kə lunj')
p. 6 (mine) levels
p. 7 headframe
p. 7 smelting
p. 7 moulds
p. 8 erosion
p. 9 immigrant
p. 9 (gold) strikes
p. 9 industrialists
p. 9 open pit mining
p. 10 uranium
p. 10 boom period
p. 11 pioneer fringe
p. 11 Canadian Shield
p. 11 Experimental Farm
p. 11 muskeg (mus' keg)
p. 13 evaporation
p. 13 pulpwood
p. 15 dilute
p. 15 softwood forest
p. 15 reseed
p. 16 cutover land
p. 18 tundra (tun' drə)
p. 18 glaciation
p. 18 striations (strī a' shənz)
p. 18 glacial erosion
p. 19 transition zone
p. 22 breakwater

QUEBEC

It is hoped that by their study of Southern Ontario pupils achieved some familiarity and understanding of the landscape of the Ontario section of the Great Lakes-St. Lawrence Lowlands. Now, with Karen Wiswell, they are ready to proceed from the known to the unknown. By the time they reach the major review question on p. 15, they have acquired enough information to provide some answers to the two problems posed.

P. 15 Reasons contributing to Montreal's growth as the largest city in Canada include:

(a) *Historic* Early foundation gave impetus to establishment of industries and services.

(b) *Port* Favorable position of sheltered anchorage on Great Lakes-St. Lawrence Waterway, intensified by trans-shipment functions due to Lachine rapids barrier; even with the St. Lawrence Seaway in use, Montreal remains to a demonstrable degree the head of navigation.

(c) *Transportation* Natural forces of land and water routes

(i) upstream and downstream St. Lawrence

(ii) Ottawa valley route directly west

(iii) Richelieu-Champlain-Hudson route south to New York

(iv) land routes to Canadian Shield and Eastern Townships

(v) great transportation centre has drawn to itself functions as air centre - International Airport.

(d) *Industry* All factors above favor assembly of goods and personnel for development of industry.

(e) *Power* Vast quantities of hydro-electricity available (compare Toronto's shortage); coal, oil, gas all easily imported.

(f) *Service functions* Once as an early settlement, now as a major urban centre, Montreal has drawn to itself a large number of service functions, e.g. universities, headquarters of International Air Transport Association.

N.B. Montreal benefits from all the factors which have favored the economic development of the whole Great Lakes-St.Lawrence Lowlands area. At Montreal, as at Toronto, certain special factors have promoted the growth of an outstanding urban centre.

Contrasting landscapes at Montreal and Toronto

	Toronto	*Montreal*
Physical	Lakeside location.	Riverside location.
	Enclosed harbor.	Elongated harbor.
	Generally level land surface	Mount Royal in city centre.
		Many old stone buildings in characteristic French-Canadian style
	Irregular field pattern	Strip field pattern

Farming in the St. Lawrence Lowlands

This topic is approached by means of a detailed study of a single farm with particular emphasis on the life and work of the family who live there. Pupils are now presented with a topographic map in full color; they are required to make a simple interpretation of the contour pattern of this map which is particularly clear and dramatic. A summary of the material in this section is provided for on p. 20, "The main characteristics of farming in the St. Lawrence Lowlands."

1. Most of the Lowlands is flat and well suited to use of large modern machinery in large fields. The special soil and climatic conditions on the slopes of the Monteregian Hills favor the development of specialist farm areas (mainly apple orchards).
2. The long, harsh winters require that animals be fed and housed for several months. Hot summers may require irrigation, thunderstorms may damage crops.
3. Mixed farming is usual. Animals and poultry supplying food for the urban centres require quantities of feed and pasture. Fruit is grown on Monteregian slopes, and vegetables and flowers near cities.
4. These farms are close to huge urban markets in Montreal, Quebec, Three Rivers, and many smaller urban centres.

The value of the vast area of the Canadian Shield to Quebec

Once again the pupil is introduced to the Shield in relation to the populated centres of the St. Lawrence Lowlands, firstly as a vacationland for Quebecers. Great similarities with Northern Ontario will be readily apparent, e.g. the recreation areas of Ste. Agathe and Kenora, the forest industries of La Tuque and Kapuskasing, and the mining and farming activities of the Quebec and Ontario sections of the Clay Belt. The significance of the greater proximity of the Quebec Shield to the urban centres must not be overlooked. Not only does this mean more accessible skiing for Montrealers than Torontonians, it means that the whole problem of distance is reduced. Canadian Shield hydro-electricity is readily available to the industries of Southern Quebec; products can be quickly transported to tidewater sites on the St. Lawrence, and all goods and personnel moved more easily.

Appalachian Quebec

This brief section provides the introduction to a major Canadian region - the Appalachian area. Its inland nature and proximity to the St. Lawrence Lowlands make the eastern Townships a kind of transition zone between the densely populated areas of central Canada and the marine-oriented lands of the eastern seaboard. Here the rugged mountain and lake country is readily accessible to the Lowlands — farm produce can be marketed in the urban centres, manufacturing centres are not far from major traffic paths, people can move freely in and out for business or pleasure. Gaspé by contrast is 600 miles from Montreal, the rugged interior and fine coastal scenery are relatively remote. Fishing

is more important than farming and most industrial development is on a small scale.

Question 1

P. 39 Summarizing Quebec's most significant features

	Canadian Shield	*St. Lawrence Lowlands*	*Appalachian Quebec*
Physical Landscape	Low, rocky mountains, little soil, confused drainage, many lakes	Flat with isolated Monteregian Hills, deep mantle of soil, often poorly drained	Mountain and lake country
Agriculture	Limited. Poor soils, severe winters (for Cartier's description, see p. 336)	Important. Mixed farming to supply food to urban centres	Mixed farming on lower areas. Maple syrup specialty
Forestry	Very important, especially pulp and paper	Unimportant	Important in several centres
Mining	Gold, iron	Building materials	Copper, asbestos
Power	Abundant hydro-electricity	None – but HEP, coal, oil, gas all easily available	Some hydro-electricity
Transportation	Difficult - long distances, rough country, few people	Easy - flat, well settled land. Water route of St. Lawrence	Mountainous but well settled and on main routes
Main Products	Pulp and paper, metallic minerals, power	Wide variety of agricultural and manufactured goods	Dairy produce, maple syrup, textiles, manufactured goods
Settlements	Mining towns, pulp and paper towns, many resorts on southern fringes	Dense rural settlement, many small towns, large cities	Many small towns, fairly dense rural settlement in valleys

2. Most Quebecers live in the St. Lawrence Lowlands because:
(a) best agricultural land of Quebec
(b) many industries
(c) good transportation

3. The Canadian Shield is important in the development of the St. Lawrence Lowlands because:
(a) great reserves of power
(b) forest wealth
(c) metallic minerals - gold, iron
(d) vacationland
4. Appalachian Canada contributes to Quebec's prosperity:
(a) agricultural products especially dairy products and maple syrup
(b) minerals - world's greatest producer of asbestos; major copper producer
(c) textiles, pulp and paper, other manufactures
(d) fish
5. Quebec controls main traffic arteries for movement of such goods as raw sugar for Toronto refineries, prairie grain for export; provides goods found in every home, e.g. brake linings, cotton textiles, aluminum wiring.

Vocabulary

p. 2 physical characteristics
p. 4 French regime
p. 5 seigneuries (sēn yər ēs)
p. 7 fortifications
p. 7 textile
p. 8 precariously
p. 10 trans-shipment point
p. 10 focus of routes
p. 12 conventions
p. 13 "one-stage" industry
p. 16 aerial view
p. 16 three-year cycle
p. 19 cash income
p. 19 market gardening
p. 19 fodder crops
p. 19 dairy cattle
p. 20 commuters
p. 21 chairlift
p. 22 Mechanized transport
p. 22 cat train
p. 23 profile
p. 25 funnelled
p. 25 installations
p. 25 fiord (fyôrd)
p. 26 bauxite (bok' sīt *or* bôk' sīt)
p. 27 cryolite (krī ə līt)
p. 27 fluorspar (flü' ər spär')
p. 27 petroleum coke
p. 27 smelting
p. 29 stockpile
p. 31 tonnage
p. 32 scarp
p. 32 ilmenite (il' mə nīt')
p. 32 titanium (tī tā' nē əm)
p. 32 tidewater sites
p. 32 landforms
p. 34 co-operative buttery

THE ATLANTIC PROVINCES

Pp. 2-7 Prince Edward Island

This sprawling island, rising only a few hundred feet above sea level, is in some ways the most maritime of all the Atlantic Provinces. Few places are more than 10 miles from salt water. Figures 5 - 1 and 5 - 2 provide striking illustrations of this fact.

However, this rolling countryside is favorable to agriculture and most of the land can be cultivated. Grain, both standing and cut, is clearly visible in Figure 5-2 and the large barn bears testimony to the importance of livestock. The province is noted for its potatoes. Agriculture accounts for more than one third of the province's total production, fishing for only one tenth. Most of the fishermen are, in fact, farmers. Agriculture accounts for a greater proportion of total production in P.E.I. than in any other Canadian province, and the rural agricultural nature of this province makes it unique. Rural settlement is dense with villages every few miles. There are no major industrial developments, and this is the prime reason for lack of growth in population.

Other parts of the Atlantic Provinces, less favorably endowed agriculturally than P.E.I., have developed their maritime resources in a striking degree.

Pp. 7-23 Nova Scotia

This section emphasizes the twin themes of the problems of making a living from the land and the various ways in which Nova Scotians have exploited the resources of the sea. Problems are cited in various ways in pp. 7-22.

(a) 17th century observers recorded forested nature of land and poor quality of upland soils.

(b) Modern soil classification map shows high proportion of forest soils, small extent of good agricultural soils.

(c) Topographic map of Lunenburg emphasizes forested nature of most of land, marshy pockets.

(d) Photographs and topographic map suggest that though gradient is seldom a problem, in other areas steep mountain slopes are an obstacle to agriculture, transportation, and settlement in Cape Breton Island.

(e) The literary description on p. 16 mentions that ice had "packed, scraped and riven" this land. This and the description of the drumlins should be related to previous studies of the problems of glaciated landscapes in Ontario.

P. 15 Question 5: Summarize the ways in which the sea helps the people of Nova Scotia to earn a living

(a) rich soils of dykelands are most favored agricultural areas.

(b) fishing - commercial and tourist.

(c) boat building - skilled craftsmen.

(d) tourism - fine coastal scenery, sandy beaches, warm water.

(e) coastal location of Sydney area a key factor in assembling raw materials for iron and steel industry.

In the study of Gaspé, with reference to travelling to P.E.I., and three times already in this section (p. 11 concerning apple markets, p. 19 concerning the growth of Halifax, p. 20 concerning coal markets), the question of the distance of the Atlantic Provinces from the main populated areas of central Canada has been touched upon.
This is a theme which will recur throughout this study and is one of the fundamental problems of the Atlantic seaboard.

New Brunswick
This section further develops the historical theme already mentioned with reference to P.E.I. and Nova Scotia. The antiquity of these settlements compared with those of central and western Canada will be further emphasized concerning Newfoundland. The failure of the Atlantic Provinces to keep pace with other parts of Canada despite the early foundations further underlines the problems facing this region.

Farming in New Brunswick
The productive farmlands shown in Figures 5-28, 5-30 and 5-32 cover a very small fraction of the land of New Brunswick. Figure 5-33 illustrates dramatically that the St. John valley, with its fairly dense rural settlement, its transportation lines, and the productive farmlands shown in the accompanying photographs, averages only one mile in width. Most of the land is higher (about 750 feet above sea level), plateau-like and heavily forested. The sample farm (Figure 5-31) has more than half its land unimproved. Most of the land is not part of farms at all.

Figure 5-34 illustrates the fact that Grand Falls has a frost-free season of only 112 days compared with 169 days at Hamilton. (83 days at Kapuskasing.) With average temperatures below freezing for five months and summer maxima in the 60's, the upper St. John valley experiences similar problems to those of Northern Ontario.

Power from the St. John valley is available for industry but often at the expense of the limited area of good agricultural lands. Mineral resources, though making a significant contribution to the economy, are not a spectacular feature.

The great expanses of productive forest were readily apparent to the earliest settlers, and they soon founded an industry which still, though changed in character, remains the mainstay of New Brunswick's economy.

P. 35 A picture summary of forestry in New Brunswick
The exercises on photographs, maps, and literary quotations in pages 32-35 should enable the pupil to deduce the following facts about forestry from a study of Figure 5-40.
(a) Dense forest cover of mixed species.

(b) Gentle valley slopes with level, plateau-like surface.
(c) Settlements are small, located on river banks, surrounded by small area of cultivated land.
(d) Rivers are used to transport logs to mills (also supply large quantities of water and power required for manufacture of pulp and paper).

P. 36 A review of New Brunswick

1. Distances, the nature of the country, the configuration of the coast and of political boundaries, all contribute to the problems of moving in and out of New Brunswick.
2. Reasons for slow growth of population include:
- isolation
- shortage of good farmland
- limited industrial development

3. According to the *Canada Year Book*, the chief ways of earning a living in 1969 were:

Manufacturing	26,500
Forest industries	3,400
Agriculture	9,500
Fishing	10,700
Mining	2,300

(N.B. Numbers for forest industries were not obtainable.)
Power, forests, and mineral wealth could all be more fully developed in future if the demand arose and capital, personnel, and facilities were available.
4. Conservation projects include:
(a) maintenance and restoration of historic features.
(b) forest conservation - partial cutting, seeding etc.
(c) control of pollution.
(d) stocking rivers with fish.

Pp. 37-54 Newfoundland

Newfoundland has no major agricultural areas comparable to those of P.E.I., the Northern Mainland of Nova Scotia, or the St. John valley of New Brunswick. Early visitors were attracted, not by the "extraordinary sticks" (as one early visitor described the huge trees of New Brunswick), but by the exceptionally rich fisheries, control of which was bitterly disputed by the European nations. Fishing remains the largest employer, but the usual problems of over-dependence on a single industry have affected Newfoundland and efforts have been made to develop the province's other resources.

After the study of Newfoundland's strategic position, fisheries, farmlands, forests, and industries, the pupil can summarize the argument using the key questions on p. 53 as a guide.

A changing way of life

Other resources include:
(a) considerable reserves of timber suitable for pulp and paper.
(b) hydro-electric power.

(c) mineral ores, iron, zinc, copper, lead, silver.
(d) strategic location on North America — European routes.
(e) people.
(f) due to poor quality of most of the soils, the gradients of many parts, and the cool, damp climate it is unlikely that Newfoundland will ever become a major agricultural area.

Lack of capital, resistance to change, problems of building communications and other facilities in a low population area, harsh climate, shortage of good agricultural land, distances from markets have all held back development of Newfoundland's resources.

Pp. 55-57 The Atlantic Provinces as a whole

As has been seen, the Atlantic Provinces share many characteristics. The final exercises in this section aim to view the region as a whole.

1. P.E.I. has its people most evenly distributed over the land because most of this province is productive farmland and villages are evenly distributed.
2. Most of the people of Newfoundland and Nova Scotia live along the coasts because the interior areas of these provinces consist of forested uplands, whereas the beautiful scenery, fine harbors, and rich fisheries of the coastal areas help create many jobs in fishing, shipbuilding, and tourism.
3. The St. John valley, with productive alluvial soils, provides a highway through the forested uplands of interior New Brunswick. Many people live in the towns, villages, and farms of the valley. Central and Northern New Brunswick is very thinly settled.
4. St. John's, Sydney, Halifax, and Saint John are shown by circles.
5. Reasons for slow growth of population include:
(a) relatively remote location and distance from heavily populated centres.
(b) vast areas of difficult terrain - their soils, steep gradients, thick forest, severe climate.

Making a living from land and sea

Using the resources of the land					*Using the resources of the sea*	
	Farmland	*Forests*	*Minerals & Power*	*Other*	*Fish*	*Other*
P.E.I.	See text p. 56.					
Nova Scotia	Some good farmland, e.g. Northern Mainland, Annapolis Valley. Fruit	Some pulp and paper. Christmas trees. Lumber for specialists crafts, e.g. furniture and boats	Gypsum-leading producer in Canada. Coal mining. Iron and steel industry. Port industries e.g. oil refining at Halifax	Scenery, e.g. Cape Breton N.P. History	Commercial and tourist fishing. Boat building	Warm water, sandy beaches, tourists and artists. Halifax major port
New Brunswick	Tantramar and St. John valley. Potatoes famous	About ½ production is from forests - mainly pulp and paper	Power from St. John Some coal mining for local use, metallic minerals	History	Fishing, shipbuilding and repairing at Saint John	Saint John major port. Some tourist development—Bay of Fundy Park
Newfoundland	No major agriculture Areas. Avalon peninsula chief area	Greatest source of province's income. Mainly pulp and paper	Iron ore, other metallic ores. H.E.P.	Strategic location on ocean and air routes	Fishing major employer still. Freezing, drying cod	St. John's major port

1. (a) Farming is important in:
(i) P.E.I.
(ii) Nova Scotia: Northern Mainland, Annapolis Valley
(iii) New Brunswick: Tartramar marshes, St. John Valley
(iv) Newfoundland: Avalon peninsula (for local use only).

(b) The chief crops are potatoes, hay, feed grains, fruit, vegetables for local use.
(c) Large areas have only a thin, stony soil cover, many parts are too mountainous, thick forest covers large areas, harsh climate limits crops which can be grown.
2. (a) Forest industries are most important in New Brunswick and Newfoundland.
(b) Pulp and paper are the chief forest products; some lumber is exported; Christmas trees.
(c) Forests also:
(i) provide lumber for specialist crafts and industries
(ii) provide recreation areas and wildlife refuge
(iii) restrict water run-off and check erosion.
3. The most important minerals are:
- coal (Nova Scotia, New Brunswick)
- gypsum (Nova Scotia)
- iron ore (Newfoundland and Labrador)
- other metallic ores (New Brunswick, Newfoundland)

(b) Nova Scotia and Newfoundland have the most people engaged in mining.
(c) Problems include:
(i) underwater deposits of coal and iron
(ii) interior location of some deposits makes transportation problems in low population area.
(d) New Brunswick (the St. John valley), Newfoundland (Exploits and Humber rivers) have good supplies of hydro-electricity.
(e) Major manufacturing centres have grown up:
(i) Around Sydney where iron ore and limestone are imported by water for smelting using Cape Breton coal
(ii) Trenton area of Nova Scotia — based originally on local coal and iron
(iii) In major ports, e.g. Halifax and Saint John — processing of imported bulk products, e.g. oil, sugar
(iv) Pulp and paper developments, e.g. at Corner Brook, Grand Falls, Chatham
(v) General industries in favorably located towns, e.g. Truro, Moncton.
4. (a) Many people depend on the sea for a living because:
(i) many areas unsuitable for farming
(ii) limited development of industries
(iii) rich fishing grounds, suitable coastline for fishing harbors.
(b) The sea contributes:
(i) valuable fisheries
(ii) scenery
(iii) location facing Europe
(iv) dykelands.
5. Conservation and development projects include:
(a) restoration of historic landmarks
(b) conservation of fish, e.g. returning young lobsters to ocean

(c) preservation of outstanding natural scenery, e.g. creation of National Parks
(d) control of lumber cutting; reseeding, etc.
(e) control of water pollution by industrial wastes, etc.
(f) control of forest fires.

Vocabulary

p. 2 indented
p. 4 deep-sea fishing
p. 4 mackerel
p. 4 hake
p. 4 master's certificate
p. 6 trapline
p. 7 dykelands
p. 12 bluenose schooners
p. 12 lobster traps
p. 15 gypsum
p. 16 moat
p. 16 garrison
p. 16 gouged (goujd)
p. 17 landsman
p. 17 barricaded
p. 17 squadrons
p. 17 promontories
p. 19 causeway
p. 19 colliery
p. 20 coal face
p. 21 blast furnaces
p. 21 ingots
p. 22 tartans
p. 22 loyalists
p. 24 plaque
p. 24 Georgian-type mansion
p. 26 hump yard
p. 29 plateaus
p. 29 terraces
p. 29 tidal flats
p. 30 tributary stream
p. 32 square timber industry
p. 33 sombre (som' bər)
p. 35 soil erosion
p. 36 hatcheries
p. 36 tidal bore
p. 39 inshore fishing
p. 42 gill net
p. 42 purse seine
p. 42 (fishing) banks
p. 43 plankton
p. 43 dragger
p. 44 (depth) sounders
p. 46 outport
p. 48 safe anchorage
p. 51 pit props
p. 53 dungarees
p. 53 physical environment
p. 53 birch-veneer mill
p. 54 livyeres (liv' yərz)

MANITOBA

It is intended that the dramatic characteristics of the prairie environment be evoked, particularly in contrast to the Shield, Lowland, and Appalachian landscapes. Visual descriptions and aerial photographs, supplemented by a topographic sheet, emphasize the flat, open nature of the prairie. In subsequent sections, similar areas will be studied in greater detail at ground level.

In this study the topic of glacial deposition, is fittingly expanded, and the significance to man is readily apparent. Similarly, the general characteristics of prairie weather are introduced before proceeding to more detailed specific facts and figures.

The material on the Red River Plains illustrates the overwhelmingly agricultural character of the prairies which form Canada's largest area of occupied farmland. Figures 6-1, 6-3, and the accompanying text emphasize the apparently limitless acres of cultivated farmland producing grain, vegetables, oilseeds, and pasture crops. Later studies will reveal that there is in fact considerable diversity of landsurface, types of farming, and rural landscapes on the prairies.

Winnipeg

The maps and photographs on pages 8-13, together with additional material on other parts of Manitoba, enable pupils to interpret facts about Winnipeg.

(a) The Red and Assiniboine rivers are wide, slow-flowing streams whose waters are heavily laden with mud and silt from the plains through which they have been flowing.

(b) At Winnipeg the routes of canoe-travelling fur traders from the south (via Red River) and west (via Assiniboine river) met.

(c) Winnipeg commands a narrow corridor of land between the international border and Lake Winnipeg. Nearly all traffic between eastern (Great Lakes-St. Lawrence oriented) and western (prairies and cordillera) Canada must pass.

(d) Wind is an outstanding weather characteristic of the open prairie.

(e) Very low temperatures in winter promote winter sports. There are no suitable slopes for skiing near Winnipeg.

(f) Storm windows are required to insulate houses from cold in winter: in summer wire screens protect open windows from mosquitoes and allow air to circulate through houses during very hot weather.

(g) The Winnipeg area is subject to severe floods if a rapid spring thaw or heavy rains cause the rivers to rise and spread over the flat prairie. The "big ditch" is to be used to divert flood water from the Winnipeg area.

(h) The area east of the Red River has a large French-Canadian population.

(i) Winnipeg is in a very favored position for assembly of people and goods; it acts as a supply, processing, and service centre for a rich agricultural region; oil and gas are available by pipeline, the Canadian Shield with great reserves of hydro-electric power is less than 100 miles away.
(j) Many road and rail routes are funnelled between the international boundary and Lake Winnipeg. The early settlement at "the Forks" became the crossing point of the Red River for many transportation routes.

Variety within the Prairies — Manitoba section, Pp. 4-18
For those who have never seen the prairies, the picture of vast flat wheatfields dotted with scattered crossroads settlements and grain elevators can properly be evoked. Having established this basic idea and atmosphere, pupils must explore the details of real situations and landscapes. The real characteristics of the Red River Plains illustrated on pp. 2-15 include:
(a) rich diversified agricultural land
(b) significant mineral wealth - oil, building materials, e.g. sand, clay, limestone
(c) commercial fishing on Lake Winnipeg
(d) vast urban complex of Winnipeg, plus many smaller industrial towns with emphasis on processing agricultural produce.

The prairies can be divided into three levels separated by quite steep escarpments. The first prairie level which covers the eastern half of southern Manitoba is about 750 feet in elevation (see Winnipeg map Figure 6-7). The second prairie level is about 2,000 feet in elevation and extends across western Manitoba into Saskatchewan. "The precipitous, bold outline rising abruptly from a level country" as described by Hind is part of the Manitoba Escarpment, the 1,000 foot elevation of which accounts for the greater part of the rise in elevation between the first and second levels. This high country provides welcome variety to prairie dwellers. Figure 6-15 shows that the rolling land is forested and that facilities for water sports are available. As shown in Figure 6-15, the Riding Mountain National Park section of the Escarpment is approached by a four-lane paved highway. This park is a recreation area for the people of Winnipeg (140 miles), Regina (160 miles), and many other parts of the prairies.

North of '54', Pp. 18-31
This section of Manitoba is part of the Canadian Shield, a major natural region already studied in some detail in Quebec and Ontario. Minerals and power are familiar resources in the Shield, and the railway journey through northern Manitoba offers a suitable opportunity to view the problems encountered in developing these resources.
e.g. (a) great distance with almost no settlement (distance from The Pas to Churchill is nearly 500 miles, actual travel time from Flin Flon to Churchill 23½ hours).
(b) rocky land surface at Flin Flon, Figure 6-19.

(c) heavy forest (see Figure 6-20).
(d) falls, rapids, and great quantities of surface water a problem to transportation.
(e) very little farmland.

The Hudson's Bay Lowland, Pp. 24-26

The fact of the Hudson Bay railway enables many Canadians to see this otherwise remote region. It is a major physiographic region, quite distinct from the Canadian Shield. By means of photographs, a large-scale topographic map, and observations made by travellers on the railway, pupils can create a vivid and accurate picture of this region.

Figures 6-22 and 6-24 show land that is flat, low-lying, and strewn with small lakes, pools, and marshes. There are few trees, no roads, buildings, mines, or other signs of human occupation outside Churchill and the railway track.

For descriptive material on the Hudson's Bay Lowland, see *Mutiny on Hudson Bay* , by Delbert A. Young, Frontier Books #3, W. J. Gage Limited, Toronto. This exciting adventure story about Henry Hudson's last voyage provides vivid descriptions of the problems of life in this region.

Churchill

The study of this somewhat unique settlement provides a splendid opportunity for pupils to recognize the blend of environmental and humanistic factors which have contributed to this development.

P. 30 1 (a) • Canada's only north coast port: of special significance to interior provinces with long rail haul to ports.
• Early fur traders claimed this area and built their fort.
• Grain, its storage and export is chief reason for existence of Churchill and the railway.
• One of few places in Canadian North with permanent land transportation to southern Canada, Churchill is natural transshipment point for people and goods. Military significance.
• Whaling is tourist sport, produces oil, also meat for animal feed.
• Railway links Churchill with south.
• Pack ice shortens shipping season to only three months.
• Direct ocean route to Europe cuts cost of transporting prairie grain to European markets.
(b) Deepwater anchorage favored harbor; relatively short rail haul from prairie wheatlands promoted construction of railway; rich furbearing hinterland promoted early development.
(c) Railway, air field, special grain handling facilities are essential factors in growth of Churchill.

Review of Manitoba

P. 31 This section emphasizes the variety of landscapes, products, and resources of Manitoba.

1. A — Red River Plains
B — Southeastern corner of Manitoba
C — Northern Manitoba between lakes and Hudson's Bay coastlands
D — Flin Flon on Saskatchewan border, Lynn Lake, or Thompson
E — Southwest corner of Manitoba
F — Winnipeg at confluence of Red and Assiniboine Rivers
G — Churchill at mouth of Churchill river
H — Lake Winnipeg.

3. Any of the following could be selected:
(a) railway rolling stock - promoted by Winnipeg's great importance as transportation centre
(b) metals - produced from Canadian Shield section of Northern Manitoba - local power for smelting
(c) cement - produced in Southern Manitoba where raw materials are quarried; large local market
(d) grain - large quantities of excellent quality grain produced in rich alluvial soils of Red River plains
(e) freshwater fish - produced from Lake Winnipeg; distance from salt water promotes development of lake fishing
(f) oil - produced in southwest Manitoba and refined for use; large local markets.

4. Manitoba has very rich farmlands which produce a wide variety of crops. Processing of agricultural produce, and the wide variety of other industries which has developed in the huge urban complex at Winnipeg account for most of the production. Note how insignificant mining, forestry, and fishing are as a percentage of total production.
Manitoba has already started to develop some major mineral deposits. There may be other great reserves in the Shield as yet unsurveyed. There are great reserves of undeveloped timber and hydro-electric power. There is already one major railway through Northern Manitoba. It seems likely that the future will see further development of these resources.

Vocabulary

p. 4 windbreak
p. 6 compost box
p. 6 humus content
p. 6 protein
p. 8 floodway
p. 10 frontage
p. 13 regional centre
p. 17 first (second, third) prairie level
p. 21 perishable goods
p. 22 spur line
p. 25 sphagnum moss (sfag' nəm)
p. 25 permafrost

SASKATCHEWAN

Pp. 2-6 Further detailed study of the topographic map and climatic data provides additional information about the character of the Saskatchewan section of the prairies. Historical information about the inhabitants of a Saskatchewan village outlines the general historical development of the prairie farmlands.*

P.6 Problems of Prairie Settlement

1. Winters were long and very cold: summer temperatures very high. Precipitation rather low, with maxima at hottest season when evaporation greatest. Wind sweeps across flat plains shown in Figure 7-1.
2. There were very few trees to provide wood for fuel or shelter. Rock for construction not easily available. Settlers built sod houses, burned hay, straw, buffalo chips.
3. If the crop fails or price declines the farmer's whole livelihood is threatened. (This compares with mining in Elliot Lake and cod-fishing in Newfoundland.)
4. The end of the long drought, wartime demand for wheat, wheat sales to Asia, use of new machinery, all helped to revive wheat industry of Saskatchewan after 1940.

Pp. 6-11 Study of modern wheat farms indicates how Saskatchewan farmers have exploited resources and tackled problems.

P. 11 Another generation of pioneer farmers

1. Prairie settlers faced drought, greater extremes of temperature, shortage of building materials especially wood; had to learn to understand a completely new environment. Since prairie settlers homesteaded one hundred years or more after pioneers arrived in Upper Canada, they benefitted from more advanced technology (e.g. steel plough) and better transportation (e.g. railway). There was less necessity for them to be self-sufficient and less danger from hostile Indians. However, note that settlers often walked long distances under difficult conditions in order to reach supply points.
2. (a) Climate
(b) Inventions and improvements

Size of farms

Sample wheat farm	1280 acres
Average for Saskatchewan	986 acres
Wiswell (Niagara) farm	25 acres
Kent (S.W. Ontario) farm	75 acres
Laliberté (Quebec) farm	188 acres

*For additional background information and atmosphere on the prairies prior to agricultural settlement, see *John Rowand, Fur Trader,* by Iris Allan, Frontier Books #4, W. J. Gage Limited, Toronto.

Enormous size of farm together with flat nature of land enables one man using large-scale machinery to practise *extensive* farming (relatively low costs per acre), in contrast with *intensive* farming (high investment per acre with high yields) in Niagara Fruit Belt.

Land Use

Wheat about half acreage: chief cash crop. Frost and drought resistent varieties developed. Special machinery and facilities for handling and marketing help make Saskatchewan major world producer of wheat.
Summer fallow helps conserve moisture.
Grazing on unproductive slough, stubble, hay from slough. Sheep fit in well with wheat because they require little attention during growing season. Community pastures: see pp. 12-13.
Dugout formed by damming stream or windmill-pumped water provides drinking water for livestock.
Barbed wire fencing assists livestock.
Treeplanting for shelterbelts helps control soil drifting.

Having established that scanty and unreliable precipitation is a major problem of agriculture on the prairies, Figure 7-12 graphically illustrates the possibilities of irrigated farmland. Saskatchewan, where irrigation projects are developing rapidly, provides the pupil with material on the possibilities and problems of such developments.

Major rivers cross the prairies in deeply entrenched valleys. This assists in the construction of dams and storage basins, but requires that irrigation water be pumped to the plateau surface. In addition to irrigation water, projects such as the South Saskatchewan Dam can assist in flood control, provide badly needed power, and be developed for recreational purposes.

P. 17 Picture summary of agriculture

1. Flat surface — F
2. Natural grassland — B
3. Windbreak of trees — A
4. Barbed wire fencing — D
5. Dugout — G
6. Windmill pump — E
7. Cattle — H
8. Wood — C

Pp. 20-28 Saskatchewan turns to industry

Figure 7-19 shows clearly that minerals (including oil) accounted for about 30 per cent of Saskatchewan's total production in 1960 and manufacturing for about 10 per cent more. Non-agricultural sources accounted for 60 per cent of Saskatchewan's total output.

Further studies in this chapter indicate how Saskatchewan has sought to decrease its dependence on wheat by developing a wide variety

of industries, and by exploiting fully the not inconsiderable mineral wealth in the southern half of the province.

Northern Saskatchewan includes a huge area of the Canadian Shield with the typical characteristics as illustrated in Figure 7-33. Resources include furs, recreational value, metallic minerals, hydro-electricity, forests. Problems of difficult terrain, severe climate, and distance from populated centres retard development of this section of the Shield, as in similar areas previously studied.

The description of Regina and its prospects in 1883, compared with map, photograph, and textual data of Regina today, is symptomatic of how Saskatchewan has overcome many of its problems and created a varied economy.

P. 35 An incorrect forecast

Regina has the following natural advantages:
(a) central location in wheat belt, in Saskatchewan, in Canada
(b) surrounded by good wheat soils
(c) flat land facilitates construction of communications, factories, etc.
(d) oil, natural gas, low-grade coal mined cheaply nearby; hydro-electricity should be available shortly
(e) minerals developed in area.

Today Regina is a major city with transportation, industrial, administrative, and cultural functions. Waskana Creek has been dammed to form a pleasant lake and many trees have been planted.

P. 37 A symbol for Saskatchewan

1. Ranching was the first activity, but soon after the first homesteaders ploughed their first fields wheat became established as a bumper cash crop in Saskatchewan. Wheat farming attracted many immigrants, and it was upon this one-crop economy that the province was established.
2. Today wheat is chief among many agricultural products. Attempts have been made to introduce other crops and livestock on wheat farms, to establish irrigated farm-lands with a wide variety of crops, and to develop non-agricultural activities. Oil and potash challenge wheat as emblems of the sixties, though deliberate attempts to establish a diversified economy prevent any one commodity from attaining the monopoly once held by wheat.
3. Nearly half the total area of Saskatchewan, including all the well settled areas and those commonly seen by travellers and visitors, consists of very flat, almost treeless land. In such country the horizons appear very far distant, as in mid-ocean.

Topics for discussion

Population trends to be mentioned include:
1. (a) farms becoming larger
(b) more and larger machinery (compare the modern farm of 1280 acres with 160 acres of homesteading days — each worked by one man)

(c) expansion of agricultural areas — pioneer farms, irrigated farms
(d) improving transportation.

Vocabulary

p. 3 Diamond Jubilee
p. 3 bench mark
p. 3 section
p. 3 homesteader
p. 5 land grants
p. 13 dugout (dug' out')
p. 15 entrenched valleys
p. 20 acidic (ə sid' ïk)
p. 25 sodium sulphate
p. 25 potash
p. 28 prefabricated
p. 30 fireguard
p. 30 smoke jumpers
p. 31 coniferous

ALBERTA

This study seeks to underline the importance of wheat while devoting more attention to ranching and irrigated farming which are more fully developed in Alberta than in the other Prairie Provinces. (For an excellent depth study of life on a cattle ranch in south-west Alberta see *Life in the Foothills of the Canadian Rockies,* by G.J.A. de Leeuw, obtainable from the author at University of Calgary.)

Pages 2-17 have emphasized the great variety of agricultural lands in Alberta. This province is world famous for the quality of its wheat; the success of its irrigation projects points the way to similar developments in other areas; cattle, for which the province is famous, are found in widely differing areas.

P. 17 The varied agricultural lands of Alberta

1. Distinctive agricultural landscapes occur in:

(a) The pioneer fringe of the Peace River Area. This area has good soils for wheat production, can also be used for raising livestock. Improved transportation (links with both Edmonton and Vancouver), major industrial developments on B.C. side, increased markets in Alberta and B. C. have promoted further opening of pioneer land in this area.

(b) The mixed farming, black soil zone of the foothills. Good soil, adequate precipitation, relatively mild winters, proximity to major urban centres enable farms to produce wide variety of crops - dairy and poultry produce for local sale; beef, hogs and wheat for export. (See Figure 8-13.)

(c) Wheat belt and dry belt. Relatively low yields per acre - about half land always in fallow produces every second year, enables farmer to get crop where annual moisture insufficient. Extensive methods, relatively low investment per acre. (See Figures 8-10 and 8-11.)

(d) Irrigated farmlands around Lethbridge. This is expensive land because of cost of producing and distributing irrigation water. Soils are rich and productive if carefully irrigated: flat nature of land assists movement of water. Near to transportation routes and major markets. (See Figures 8-8 and 8-9.)

(e) Dry belt of southwest Alberta. (See Figure 8-5.) Moisture inadequate and unreliable for crops, but livestock flourish if rangeland not over-grazed. Chinook raises winter temperatures and enables cattle to remain outdoors all winter.

2. (a) Chief problems faced by Alberta farmers:

(i) scanty and unreliable precipitation, high summer temperatures except favored parts of Mixed Farming Belt. Overcome by major

irrigation systems, dugouts surrounded by trees to retard run-off, trash cover to retard evaporation, dry farming methods, development of drought resistant varieties of seed.
(ii) Long, cold winter, often alleviated by chinook, though chinook is unreliable and may cause ice cover. Use of modern transportation and communication facilities enables farmers to supply hay if grazing becomes impossible.
(iii) Hail and violent summer storms with floods. (See p. 14)
Insurance only protection.
(iv) Soil erosion by wind or sudden floods. Restoring grass cover to problem areas, planting shelterbelts of trees in key locations in cropland helps hold soil and break force of wind.
(v) Removal of forest in pioneer areas of north. Improved transportation and machinery enable clearing to be quickly accomplished.
(b) Acreage is increasing by:
(i) extended irrigation systems
(ii) opening pioneer areas of north.
Rapid growth of Alberta in last two decades and growth of Canadian population as a whole has greatly increased demand for agricultural produce.
3. (a) Beef, including fine quality meat, meat for beef products (e.g. canned meats and soups), vegetables, poultry products and wheat, are chief food products sold outside.
(b) Soils are generally favorable to production of wheat and other field crops.
Warm sunny weather assists growth where moisture is sufficient.
Amelioration of winter cold by chinook assists wintering livestock.
Good natural pasture for cattle.
Ease of marketing products by major road and rail links to large urban centres.

Non-agricultural resources of Alberta

The following table gives the composition of the gross product of Alberta in 1966. Note that non-agricultural resources account for approximately 4/5 of the total.

Industry	*Millions of $*	*% of total*
Agriculture	754.7	17.3
Construction	1,294.7	29.5
Electric power	80.3	1.7
Fisheries	.7	—
Forestry	25.4	.6
Manufacturing	1,374.4	31.4
Mining	846.7	19.4
Trapping	5.3	.1
Total	4,382.2	100.0

P. 34 1. Stages
(a) survey for likely sites.
(b) obtaining land title and permission to drill.

(c) drilling.

Problems
(a) distance and transportation often through unsettled country.
(b) heavy forest, rugged mountains, near desert terrains to be prospected.
(c) heavy expenses for use of complex machinery and trained personnel.

Incentive
(a) Oil has so many uses in modern economy.
(b) Oil equipment - drills, pumps, tanks, etc. a conspicuous feature of landscape. Responsible for great urban growth, extension of farmlands, increased prosperity.
(c) Oil vital to modern economy. Nearly 3/4 Canadian output of oil is from Alberta. Used and refined in every province except Atlantic Provinces. Oil by-products, e.g. plastics, used in every home.
(d) Oil is exhaustible resource, is being used up at alarming rate. Controls over drilling and production ensure that reserves are not wasted.
2. (a) Coal has undergone general decline relative to oil and hydro-electricity. Coal is bulky, dirty. Mines are in relatively remote part of province, in mountainous country of southwest corner.
(b) Alberta has huge oil and gas reserves (including Athabaska tar sands), greatest coal reserves in Canada, abundant potential hydro-electricity in Rocky Mountains.
3. Forested zones are in northern part of province, not yet served by good transportation, remote from main populated centres which can more easily obtain forest products from east or west via major transportation links. Quebec and Ontario Northland was opened up for mining and forest industries, using established communications, got head start. (Kapuskasing mill was producing in 1920.)

In the Columbia Icefield study, pupils study a glacier at work and see many of the familiar features of glaciated landscapes in the making.

P. 39 A glacier at work

1. The Athabaska glacier is about fifty feet high at its snout and is many hundreds of feet wide. The surface is ribbed and cleft by deep longitudinal crevasses. Ⓒ shows tributary glaciers.
2. Ⓐ shows a lateral moraine built up of sand, rocks, and mud deposited by melting ice along the glacier edges.
3. The water is very cold because it has been formed from melted ice. Contact with ice and the high altitude help keep it cold.
4. Ⓑ shows a frost-shattered ridge.
Ice performs its work in several ways:
(a) continual freeze and thaw action at edges, expansion and contraction causes shattering.
(b) moving ice containing boulders, gravel, etc. has scouring action on land surface over which it passes.
(c) moves material from one site to another and deposits it in various forms (see Chapters 2 and 3).

Glaciated landscapes have a characteristic jagged appearance. Slopes are steep, ridges sharp and pointed. Deep U-shaped valleys (See p. 37) are hollowed out, and the surfaces over which ice has passed are pitted with hollows or rock basins which usually contain lakes.

An overall view of the Prairie Provinces

Manitoba, Saskatchewan, and Alberta each have distinctive landscapes, personalities, and functions. Yet they have unity in their location between the sharp eastern edge of the Cordillera and the Great Lakes, and in the major natural region of the prairie grasslands. Sections of Alberta share the geographical characteristics described in detail in the Saskatchewan Wheat Belt, oilfields in Saskatchewan and Manitoba have similar history, economics, and functions as those studied in Alberta; the pioneer fringe studied by means of a photograph in Saskatchewan and by a large-scale map in Alberta is one geographical region extending through Alberta, Saskatchewan, and Manitoba and beyond to both east and west. To avoid repetition and to provide depth study, each major topic has been studied only once and briefly referred to in other cases. In pages 40-43, pupils view these provinces as a whole.

P. 41 An overall view of the Prairie Provinces

1. (a) 1. level or undulating.
2. without trees.
3. great extent.

(b) Only about 1/4 of the total area of these provinces is included in the treeless prairie.

(c) Within the prairie sections, landscapes include rich farmlands (e.g. Red River plains), irrigated truck farms (around Lethbridge), dry farms (southwest Alberta), wheat lands (around Regina), hilly sections (e.g. Cypress Hills, Manitoba Escarpment).

2. (a) Most of Southern Saskatchewan is included in the Wheat Belt or in the Dry Belt which also produces wheat. The mixed farming area covers a relatively small proportion of Saskatchewan.

(b) Saskatchewan has diversified its farming, e.g. extended irrigated acreage, increased livestock; has developed mineral resources and promoted industrial enterprises. A more widely based economy is less liable to collapse due to vicissitudes in production or marketing of a single product.

3. (a) Most of these provinces receive less than 20 inches of rainfall annually. High summer temperatures intensify evaporation during the growing season.

(b) Manitoba's farmlands suffer least from drought.

(c) The well watered area of southwest Alberta is a very mountainous region unsuited to agriculture.

(d) Drought is being overcome by:

(i) conservation of moisture by treeplanting, saving spring meltwater in dugouts, conserving moisture by summer fallowing, reducing

evaporation by use of trash cover
(ii) irrigation developments
(iii) wells (operated by windmills or electricity)
(iv) development of drought resistant varieties.
(e) Sudden violent storms, blizzards in winter; hail, violent rains in summer, wind, extremes of temperature, short growing season are other problems. Restoration of grassland and treeplanting helps control flooding and erosion; quick maturing varieties of seed enable farmers to push cultivation into areas of shorter growing season, imported winter feed helps stock through severe winters.
(f) Adequate precipitation at crucial growing season and warm summer temperatures are favorable to wheat production.
(g) Wind powered pumps for early wells; can make weather unpleasant and cause serious soil erosion.
4. The Park Belt consists of generally flat land dissected by deep valleys. The forest vegetation of the north is interspersed in groves among the prairie grasslands, such as are found in the treeless south.

5.	*Northern*	*Southern*
Physiography	Low relief	Flat
Soil	Much bare rock. Thin, rocky soil in hollows	Deep, stoneless soil
Surface water	Abundant - many lakes in Canadian Shield.	Few deeply entrenched rivers — intermittent streams — general shortage of water
Vegetation	Forest	Grassland
Land Use	Forest, mixed farming in southern parts	Crops especially wheat; ranching, irrigation projects
Minerals	Metallics in Canadian Shield	Oil. Building stones, etc.
Transportation	Little developed Some north-south roads and railways	Many major highways and railways — east-west oriented
Settlement	Sparse	Evenly distributed rural settlement. Major cities
Occupations	Some mining, tourism, trapping	Agriculture, industry

5. (a) Distances, lack of communications, heavy forest, harsh climate, poor soil are all common problems of the Canadian north.
(b) Northern areas provided reserves of minerals, forests, hydro-electricity, recreation lands as yet largely untapped.
(c) The Hudson's Bay railway is a great advantage to Northern Manitoba.
6. (a) Southwestern boundary of Alberta - a resource area for tourism, hydro-electricity and forestry.
(b) Alberta is nearest to Vancouver and Prince Rupert — assists marketing especially with Asian countries.

(c) Manitoba – short rail haul to ocean shipping.
(d) Saskatchewan – central location for assembling and supplying goods and personnel.

7. (a)

flat land	oil, gas, and coal
productive soil	non-metallic minerals,
irrigation water	e.g. potash
grazing lands	forests
metallic minerals in Shield sections	mountain scenery

(b) Recent years have seen increased development of oil (with construction of refineries and pipelines), metals (e.g. Thompson and Lynn Lake), forest industries (e.g. Hinton Mill), irrigation projects (e.g. South Saskatchewan dam), mining (e.g. potash, clay, salt), scenery (new roads and other facilities).
(c) Conservation is promoted by:
(i) legal controls, e.g. control of grazing, control of oil production.
(ii) education and advertising, e.g. forest fire prevention, formal courses and advice for farmers.
(iii) industrial policies, e.g. efforts at Hinton Mill to reduce pollution.
(iv) special projects, e.g. P.F.R.A., P.F.A.A.
(v) National and Provincial parks protect natural features.

Vocabulary

p. 4 rangelands
p. 4 chinook wind (shi nůk')
p. 4 chinook arch
p. 4 barometer
p. 4 compression
p. 6 homogenized
p. 6 milkshed
p. 7 by-products
p. 7 apex
p. 8 shelterbelts
p. 9 inoculation
p. 17 mixed farms
p. 17 fallow fields
p. 19 adhesives
p. 21 core drill
p. 23 (oil) rig
p. 23 lubricants
p. 23 asphalt
p. 24 polyethylene (pol´ ē eth' ə lēn)
p. 24 exhaustible
p. 26 kilowatts
p. 29 bluffs
p. 32 "leapfrogging"
p. 32 radiating
p. 37 U-shaped valley
p. 37 canyon-like
p. 38 mountaineer
p. 38 moraine-dammed lake
p. 38 frost-shattered
p. 39 cirque (sėrk)
p. 41 undulating

BRITISH COLUMBIA

Use of the region assists geographers to handle the complexity of their subject matter. No region is complete unto itself, and in some cases adjacent regions are very closely inter-related. Thus, in British Columbia, the Lower Mainland is part of Coastal British Columbia on account of its location, its maritime climate, and the close associations with the coastal areas north of Burrard Inlet. However, this region presents so distinctive a landscape and has such unique functions that it must be considered separately.

The study of the topographic map on p. 10, always one of the best tools of the geographer, supplies information about the nature of both these regions and their inter-relations. It also provides a great deal of data about Vancouver.

P. 7 1. *Vancouver has become Canada's second port and third largest city* because:
(a) Fine natural harbor
(b) Ice-free all year
(c) Faces Asian markets
(d) Transshipment point — terminus of trans-continental railways, highways, ocean routes, international airlines, north-south land, water, and air routes
(e) Outlet for rich primary producing areas — lumber and fish in immediate hinterland, grain, potash, etc. from prairies by rail
(f) Pleasantly mild climate, scenic attractions attract population.
2. *Features making the Lower Mainland a distinct region in contrast to Coast Mountains to north*

Southern half (Lower Mainland)	*Northern half* (Coast Mountains)
Flat, low lying, poorly drained.	Very mountainous (peaks nearly 6,000 feet) steep-sided valleys. Many lakes and streams.
Heavily forested.	Most forest cleared for agricultural or urban development.
Dense rural settlement. Vancouver metropolitan complex.	Settlement confined to shores of Burrard Inlet.
Close network of sideroads, major highways, and railways.	Road and rail routes along coast only. No communications with interior.

P. 22 **Coastal British Columbia** may be reviewed briefly by use of the questions on this page.

The coastline is *deeply indented with high mountains on all sides.* Most of the land is *heavily forested mountain slopes.* The climate may be summarized as *mild, wet winters and warm, dry summers.* The chief form of vegetation is *very large coniferous trees.* Most of the people

live in *the Lower Mainland.* Farming is important in *the Lower Mainland.* The chief agricultural products are *dairy produce and vegetables.* The chief centres of the forest industries are *Alberni, Powell River, Ocean Falls, and New Westminster.* The most valuable fish caught are *salmon and halibut.* Power is obtained from *local hydro-electric sites and imported fuels.* Mining is *relatively unimportant. Port Alberni* is a town based on forest industries, *Prince Rupert* is a fishing port and route centre which is developing new functions and industries. *Vancouver* is Canada's third largest city — a great port with varied industries. *Victoria* is the provincial capital of British Columbia — an industrial city and port with special naval functions.

Interior British Columbia

The Southern Interior presents striking contrast to the coastal region. Figures 9-27 and 9-29 contrast strongly with Figure 9-21. The land remains mountainous, but the vegetation and land use testify to the great contrast in climate presented by means of selected statistics on page 24. Furthermore, interior B.C. is cut off from the coast by very difficult mountain country. The scene shown in Figure 9-26 and described on page 23 is still the main route to the coast. In 1947 an alternative route via the Hope-Princeton highway was opened. This provides a modern paved highway through the Cascade Mountains, but high altitudes and steep gradients often make it difficult and dangerous in winter. Thus the valleys of the Southern Interior have developed in isolation from each other and from outside regions.

P. 31 A Backward Glance at the Southern Interior

Specialized fruit growing has developed where irrigation water can be applied to the patches of flat productive land on the benches. On the huge ranches in this mountainous country, beef cattle and sheep graze the pastures and among open woodland which forms the basis of the logging industry.

Tourists like to visit the area because:

(a) beautiful mountain scenery
(b) beautiful lakes and streams
(c) unspoiled countryside, hunting and fishing
(d) sunny summer climate, little fog or rain
(e) special local attractions, e.g. fruit blossom in spring.

Further north the special soil and temperature conditions which favor fruit production in the Okanagan no longer apply. This region is much more remote from major communication arteries. Long, severe winters, heavy forest cover, distance from populated centres, lack of communications all make farming difficult.

P. 33 Why was travel so difficult in the 1860's?

Barkerville is 460 miles from Vancouver. This distance had to be traversed on foot or by pack horse. Later horsedrawn coaches made the trip over rough roads. Some sections could be travelled by boat, but several changes were necessary as water transport could only utilize

lakes or calm stretches of rivers. The land is very rugged and heavily forested. When trails were established there were few sources of supplies. Sometimes lawlessness made travelling dangerous.*

The Peace River District

Figure 9-37 supplies the basic information about this region. It is part of the prairies and exhibits the same features that have been studied in Alberta and in previous chapters.

P. 35 "It doesn't seem like British Columbia at all."

As a part of British Columbia, it is unique and noteworthy. Outstanding characteristics compared with Kamloops are:

(a) Flat landscape

(b) Vast extent of agricultural lands (in other parts of B.C., cultivated land is overshadowed by encircling mountains)

(c) Emphasis on wheat — fruit, cattle and truck farming dominant in other parts of B.C.

(d) Extremes of temperature, especially severe winter cold.

Kootenay region

This region of southeastern British Columbia contains some of the finest mountain scenery in the world. As can be seen on page 34, there is very little level land for cultivation. The trench floors are 3,000 feet or more in elevation. The reclaimed "flats" shown in Figure 9-39 are by far the most extensive area of agricultural land in this region. Most other patches are much smaller. The area has considerable industrial significance and potential. There are significant mineral reserves and abundant power.

P. 39 Reviewing the Kootenays

Kootenays for Industry

(a) Lead, zinc, silver, gold, copper, tungsten, iron, gypsum mined in area

(b) Many hydro-electric sites already developed, great undeveloped resources

(c) Coal, oil, and gas easily available

(d) Abundant fresh water available

(e) Labor supply of skilled workers of industrial tradition

(f) Many communications and special facilities already established

(g) Pleasant area to live.

Kootenays for vacations

(a) Mountain and lake scenery — many national and provincial parks

(b) Abundant wildlife — hunting and fishing

(c) Accessible by road, rail, air

(d) Facilities and services

(e) Places of historic interest.

*For background material on The Cariboo Gold Rush, see *The Lost Stagecoach*, by Austin Frith, Frontier Books, W.J. Gage Limited, Toronto.

mountain ranges reach 9,000 feet. Scenes such as those shown in Figures 10-3 and 10-7 extend over huge areas and promote the idea of flatness in the Northland.

More people travel across the Arctic today then ever before

True. — Air travel with non-stop long distance flights between North America alone would support this statement. Survey and development of the Northland also increases travel.

The Northland will soon have as many people as Southern Ontario

False. — Population may increase fairly substantially, but this land could never support a dense rural or industrial population.

Vocabulary

p. 5 tree-line
p. 5 tundra (tun' drə)
p. 5 premises
p. 7 tripods
p. 7 perishable goods
p. 9 utilidor (ū til' ə dôr′)
p. 16 Arctic char
p. 18 eider down (ī' dər down′)
p. 18 microwave

OF CANADA

Northern Ontario
Quebec
The Atlantic Provinces
Manitoba
Saskatchewan
Alberta
British Columbia
North of Sixty

GAGE